

**VARIABLE-PITCH ARM STAR CONSTRUCTION FOR ROTARY  
MOLDING MACHINES FOR MAKING, BY DRAWING AND BLOWING,  
PLASTIC VESSELS AND BOTTLES, AND ROTARY MOLDING  
MACHINE COMPRISING THE STAR CONSTRUCTION**

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**BACKGROUND OF THE INVENTION**

The present invention relates to a variable-  
pitch arm star construction for rotary molding  
machines for making, by drawing and blowing, plastic  
10 vessels and bottles, and a rotary molding machine  
comprising the star construction.

More specifically, the field of the invention  
is that of the machines which are used for making  
plastic material bottles and vessels, particularly of  
15 PET, by a drawing-blowing molding process, carried  
out starting from a molded preform.

For making the above mentioned bottles or  
vessels, a starting preform or parison, consisting of  
a tubular PET body having a closed bottom, is heated  
20 to a desired molding temperature, drawn, pre-blown  
and blown to a final forming pressure, for forming  
the bottle inside the mold.

In the above mentioned types of molding  
machines, the molds are rotatably supported on a  
25 supporting star or wheel construction, upstream and  
downstream of which are provided star arrangements,  
respectively for supplying the parisons and removing  
the blown bottles.

In particular, the star construction designed  
30 for feeding the parisons to the mold must be adapted  
to receive the parisons from a rotary feeder having a  
small operating pitch, and to transfer the received

parison toward the mold supporting wheel, which has a larger pitch.

Variable pitch arm star construction are also known: however, they are greatly complex, and their  
5 variable pitch can be replaced or re-timed only by performing very difficult operations.

#### **SUMMARY OF THE INVENTION**

Accordingly, the main object of the present  
10 invention is to overcome the above mentioned drawbacks of the prior art, by providing a variable pitch arm star construction which allows to quickly and simply replace the cams thereof, depending on the preselected operating pitch.

15 The above and yet other objects, which will become more apparent hereinafter, are achieved by the star construction according to claim 1.

Preferred embodiments of the invention are disclosed in the remaining claims.

20 With respect to a conventional prior star construction, the variable pitch arm star assembly according to the present invention allows to perform, in a very quick and simple manner, all of the operations which are necessary for modifying the  
25 pitch of the star arms.

#### **BRIEF DESCRIPTION OF THE DRAWINGS**

The above mentioned, as well as yet other characteristics and advantages of the invention, will  
30 become more apparent from the accompanying drawings, in which is shown, by way of an example and not of limitation, a preferred embodiment of the inventive

variable pitch arm star construction.

In the drawings:

Figure 1 is a top plan view illustrating an operating assembly for feeding the parisons and removing the blown bottles, said operating assembly including two variable pitch star constructions according to the invention;

Figure 2 illustrates the operating assembly shown in figure 1, the star construction being respectively shown in a side view and in a cross-sectional view;

Figure 3 illustrates, by a top plan view, the gripper assembly of the star construction of the preceding figures;

Figures 4 and 6 illustrate the gripper assembly of figure 3, respectively by a cross-sectional view B-B, a cross-sectional view A-A and a front view;

Figures 7 to 10 respectively illustrates the operating steps for starting the parison taking operation, removing the parisons from their supply, introducing said parisons into the mold, and releasing said parison in said mold.

#### **DESCRIPTION OF THE PREFERRED EMBODIMENT**

The operating assembly shown in figures 1 and 2 comprises a supplying star construction 1 for feeding or supplying the parisons 2 to the mold 3, supported by a respective star construction 4, and a further star construction 5 for taking or removing the bottles 6 from the mold 3.

Said star constructions 1 and 5 are in turn

provided with a plurality of variable pitch arms 7, each having gripper elements 8.

More specifically, the variable pitch arm 7 shown in figures 3 to 6, comprises two levers, respectively indicated by 9 and 10, designed for cooperating with respective contours of cams 11 and 12 at their end portions 17 and 18 (see figures 2, 7, 8).

Said levers 9 and 10 are in turn mutually pivoted at a pivot pin 13 supported by a supporting flange 14.

The lever 10 has a substantially L-shape construction, with an end portion 15 articulated on the gripper 8 at a double pin element 16.

The lever 9, which also has a substantially L-shape, has an end portion 19 thereof pivoted on a connecting rod 20, in turn articulated on the double pin element 16.

As is clearly shown in figures 4 and 6, the end portions 17 and 18 of the levers 9 and 10 are provided with a different diameter double-bearing, respectively indicated by the reference numbers 21 and 22.

Said bearings are designed for engaging in a corresponding engaging slot, defining the above mentioned cam contours 11 and 12.

As shown in figure 6, the larger diameter bottom portion 23 of the double bearing 22 (or 21) interferes against the inner edge 24 of the cam contour, whereas the smaller diameter top portion 25 of that same bearing bears on the outer edge 26 of said cam contour.

Thus, it is assured a proper rolling ratio between the end portions of the levers and the respective cam contours, thereby advantageously eliminating any clearances.

5       The mode of operation of the variable pitch arm star construction according to the invention is shown in figures 7 to 10, in which have been shown the different operating positions assumed by an arm and related gripper, respectively as the arm is moved  
10 toward the parison, as it removes the latter, and is moved toward the respective mold to release the parison in said mold.

Owing to the very simple construction of the variable pitch arms 7, the latter can be easily and  
15 simply removed from their supporting star construction, for their replacement or for adjusting them, by merely removing the respective supporting flange 14 from the star construction body (for example by removing screws or other fixing elements).

20       While the invention has been disclosed and illustrated with reference to a preferred embodiment thereof, it should be apparent that the disclosed embodiment is susceptible to several modifications and variations, all of which will come within the  
25 scope of the invention.